See also:

smartbear.com/blog/flexible-display-on-its-way-to-your-next-phone-or

Flexible Display: On Its Way to Your Next Phone or Tablet, Or Maybe Not.

and receive texts or emails while preserving the entire real estate of the main screen. Another prototype showed wraparounds on the bottom. Berkeley also briefly showed a thin, flexible, bendable screen.

However, Berkeley didn't provide a release date or price for the Youm, only saying that the company was planning on shipping it to its partners in the future. Of course, that didn't stop rumors (which proved to be false) that it might be available on the Galaxy S4. Samsung also showed flexible display models at last year's CES, as did Sony and Nokia.

Still, OLED technology, whether it's on the Youm or some other OLED device, could be the key to bridging the gap between prototype and reality, though obstacles remain, according to Mark Fihn, a consultant and publisher of Veritas et Visus, a group of newsletters about the flat panel display industry.

“Right now, the biggest problem is that liquid crystal display, which dominates in every product, requires a very high-temperature manufacturing process and can only be done on a substrate like glass,” Fihn said. Flexible display is mostly being created using a batch process, doing the manufacturing on glass, then peeling off the flexible plastic substrate. But that’s complex and expensive. To bring down the cost for wide-scale distribution, flexible display devices would need to be manufactured in rolls instead.

With OLED, that could happen. Manufacturing could be done at lower temperatures, enabling plastic to be used and eliminating the need for glass. But there’s another problem: what about all the existing multi-billion-dollar batch LCD factories? Shifting to roll-to-roll could put them at risk, and manufacturers aren’t exactly eager to do that.

Another complication is layers. Most displays have multiple layers of glass, and replacing all of them with something flexible poses problems of its own.

For example, an LCD phone or tablet display might have a black layer, a color filter layer, an anti-glare layer, and an anti-smudge layer. On a TV, you need an anti-reflection layer. Hospitals might want an anti-microbial layer.

Using plastic instead of glass, some of these layers might be combined, but others would have to be separate, and then they would have different coefficients of thermal expansion—in other words, they would move differently at different temperatures.

Think of a stack of papers that you pick up, then put down someplace else. Some of the papers may slide out of place. With plastic, that translates to adhesion, cracking, and overall performance issues, Fihn said. Moisture could be another problem, since water causes OLED to decay quickly. Moisture from the air or from your fingertips can permeate plastic, whereas glass keeps it out.

A different issue, which Fihn sees as the number one problem with flexible display, is creating a market.

Is there really a demand for flexibility, or is it trade-show eye candy?

Certainly, there’s a very real trend toward larger screens.

“They getting bigger and bigger, including a 6-inch display shown by the Chinese company Huawei,” says Chris Jones, principal mobile analyst at the technology analyst firm Canalys in Palo Alto.

Though they’re selling quickly, to some people’s minds large-screen cell phones are already too big: awkward to hold up to your ear, impossible to jam in your back pocket. A display that wraps around the device or folds or rolls up would create more room without the extra size and heft.

“Clearly, there is pressure on Apple and everyone else to increase screen size. But you want to keep it practical, so if you can use every possible millimeter and wrap around for display, that would be a good thing,” Jones said. He thinks we may see some flex devices come to market in

the next year or so.

Not everyone agrees. “It may take a number of years,” according to Carl Taussig, director of display research at HP Labs in Palo Alto. “There’s a huge investment and overcapacity for manufacturing glass. A transition would take the better part of the next decade.” HP is not announcing any plastic-based products coming to market. Eventually, however, Taussig sees plastic taking over, and “glass will seem as anachronistic as cathode ray tubes do today.”

In the future, rollable and foldable displays will create more possibilities for software developers, who will be able to create apps for a dynamically reconfigurable screen.

Or screens. Plastic Logic, a company building on the science developed by Queen’s University’s Human Research Lab in England and Canada, demonstrated a prototype at CES called PaperTab. It’s a “paper tablet PC” that functions not as a single device, but as a series of e-ink plastic sheets, each capable of displaying a separate document or app. Tapping together two of the sheets, or “tabs,” allows them to share information. Bending parts of a tab can enable it to, say, open an email, or fast-forward through a video. Each tab is an app. You kind of have to see it to understand it.

In the demo, the tabs are connected by cables to wiring under a desktop. But the idea is to someday connect them via the cloud, said Rachel Lichten, business communications manager for Plastic Logic.

PaperTab does eliminate the problem of sliding plastic layers within a device. But what happens if you lose one of the PaperTabs? What if you no longer want the app it represents—can you change it?

“You’re asking me questions as though this were a finished product being manufactured,” Lichten said. “It is a concept.”

When might we see it? Maybe in the next 10 years if they can get the circuit boards and processors to be flexible, perhaps by using chips connected by flexible ribbons.

One company that demonstrated at CES has announced concrete plans to bring a flexible technology *component* to market. Atmel has developed a new kind of touch sensor that Asus is now using in some of its MeMO Pad tablets.

Atmel’s XSense touch sensor is a thin plastic film that fits like a sandwich between a glass or plastic top and an LCD beneath. It doesn’t enable a device to roll up or fold into your pocket, but it does allow manufacturers to use curved, “edgeless” designs, with display on the curve.

Some see the new design as revolutionary Others fear it could be a concave pain in the thigh.

In any case, it’s a start.

“What we see is only the beginning stages,” said Mariel van Tatenhove, Atmel’s marketing director. “Over time, it will enable developers to come up with completely new designs not possible before.”

Just don’t ask when.

Photo source: tech4teacher.wordpress.com
